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INDUSTRIAL HYGIENE LABORATORY ACCREDITATION
"THE JSC EXPERIENCE"

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The American Industrial Hygiene Association (AIHA) is a society of professionals dedicated to the health and safety of workers and the community. With more than 10,000 members, the AIHA is the largest international association serving occupational and environmental health professionals practicing industrial hygiene in private industry, academia, government, labor, and independent organizations.

In 1973, AIHA developed a National Industrial Hygiene Laboratory Accreditation Program. The purposes of this program are shown in Exhibit 1.

Exhibit 1. Industrial Hygiene Laboratory Accreditation**Purposes for Accreditation**

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- o Establish and maintain the highest possible standards for laboratories analyzing samples which evaluate workplace exposures.
 - o Encourage laboratories to employ well-qualified personnel, follow controlled procedures, and utilize properly maintained equipment.
 - o Proficiency Evaluations.
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There are now 350 AIHA accredited commercial, industrial, academic and government laboratories in the United States, Canada, and overseas. More than 1,000 laboratories participate in AIHA's multi-element Proficiency Analytical Test (PAT) Program.

The Environmental Health Laboratory at Johnson Space Center (JSC) achieved laboratory accreditation by the American Industrial Hygiene Association in 1986. The procedures to acquire and maintain accreditation are very detailed and require that specific criteria be satisfied. Industrial hygiene laboratories seeking accreditation must employ certain key personnel, have a comprehensive Quality Control (QC) Program that meets strict guidelines, have a safe and properly equipped facility, and maintain proper recordkeeping and methodologies. In addition, participation in the AIHA PAT program is a prerequisite to qualifying under the Laboratory Accreditation Program (LAP) (Exhibit 2).

Exhibit 2. Standards for Accreditation

AIHA Proficiency Analytical Testing (PAT) Program

- o Required for All Categories of Contaminants Analyzed
 - o Initial Accreditation Requirement
 - o Requirements for Maintaining Accreditation
 - o Requirements for Reaccreditation
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Laboratories in the LAP are required to analyze all categories of contaminants from which samples are accepted for analysis. This presentation outlines these requirements in detail and offers some insight into the steps necessary toward proficiency analytical testing, completion of the accreditation application, cost for the program, the site visit evaluation and, finally, what is required by the Laboratory Accreditation Committee (LAC) to maintain accreditation.

Industrial hygiene laboratories applying for initial accreditation must be enrolled in the AIHA PAT Program or some proficiency testing program accepted by the LAC and must complete two consecutive rounds of quarterly analyses with no more than 5 percent total outliers. Outliers are defined as any value exceeding a +2 or -2 standard deviation from the reference value for an analyte. Laboratories may opt to seek

accreditation based on analysis of all or part of the samples offered. PAT samples available for analysis are silica, asbestos, solvents, and metals. Four samples and a blank are submitted in each category. Our laboratory at JSC performs analysis of all components with the exception of silica.

Accreditation program dues are \$500.00 a year. The annual sample kit fee is \$1,248.00. To include silica would add \$552.00 to the annual cost. When a site visit is conducted, you must pay all travel costs associated with the visit.

The next step to accreditation is the application process. For purposes of proper evaluation by the LAC, an organizational chart is required as well as a brief description of the laboratory operation. Personnel profiles for the Laboratory Director, Laboratory Supervisor, Quality Control Coordinator and Industrial Hygiene Analysts are to be submitted. These profiles outline the education and experience required for each position (Exhibit 3).

Exhibit 3. Standards for Accreditation

Personnel

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- o Laboratory Director (overall operation)
 - Bachelor's degree in a basic science
 - Either five years industrial hygiene experience beyond degree or full ABIH certification
 - o Laboratory Supervisor (day-to-day operation)
 - Bachelor's degree in a basic science
 - Minimum five years industrial hygiene experience beyond degree or full ABIH certification in chemical aspects
 - o Quality Control Coordinator (QCC)
 - Bachelor's degree in a basic science
 - Knowledge of statistics and QC procedures
 - o Industrial Hygiene Analyst
 - Qualified by education and/or experience
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Quality Control

As can be seen in Exhibit 4, you must also submit a written quality control (QC) plan and the Table of Contents from the Laboratory Quality Assurance Manual. A description of intralaboratory quality control procedures for both precision and accuracy is also required. You must provide examples of current completed worksheets, control charts, and reports, and indicate procedures used for routine checking and calibration of equipment and instruments used for industrial hygiene analysis. A description of the process utilized in the adoption and revision of analytical procedures in the laboratory must be included. Further QC information required for the application includes a description of laboratory policy about participation in proficiency programs or comparative studies "round robin" QC exchange with other laboratories. Most of the time, laboratory QC sample exchanges are done with other AIHA accredited laboratories.

Exhibit 4. Standards for Accreditation

Quality Control Program

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- o Written Quality Control Plan
 - o Designated Quality Control Coordinator
 - o AIHA PAT Participation
 - o Records of Control Samples
 - o Records of Routine Calibrations of Instruments
 - o Adequate Retrieval of Quality Control Data
 - o Reagent Checks
 - o Cleanliness and Housekeeping (avoid contamination)
 - o Asbestos Analysis Must Comply with CFR 1910.1001 Appendix A
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In the event an external laboratory is contacted for analysis of samples, a description of the laboratory selection process and control procedures must be provided.

Asbestos

Asbestos is regarded with particular interest. An entire section of the application is devoted to asbestos. Laboratories seeking fiber counting accreditation for asbestos fiber index must be prepared to document all formal or in-house training that each asbestos analyst has received. A summary of the course outline must be submitted, along with a listing of your equipment available for the analysis of asbestos using NIOSH Method 7400, a copy of the methods written by your laboratory (Standard Operating Procedures), and a written QC manual which addresses asbestos specifically. Asbestos QC requirements must comply with CFR 1910.1001 Appendix A. Examples of completed QC information such as QC tables and/or charts must be supplied as evidence of proper documentation.

AIHA also has a proficiency testing program for the analysis of asbestos in bulk materials. Samples are distributed through the Research Triangle Institute in Research Triangle Park on a quarterly basis. This program is similar to the National Voluntary Laboratory Accreditation Program (NVLAP), but no site visit is conducted. NVLAP is run by the National Institute for Standards and Technology. Proficiency testing along with quarterly round-robin sample exchanges with other laboratories accounts for a large percentage of the QC done in asbestos work.

Facilities

An industrial hygiene laboratory should have the physical facilities, ventilation, utilities, and safe procedures for chemical storage, usage, and disposal, and have safety equipment and sanitary conditions adequate for the services provided (Exhibit 5).

Exhibit 5. Standards for Accreditation

o Facilities	o Records	o Methods
- Safety Equipment	- Numbering System	- Accepted and Documented
- Ventilation	- Calibration and	IH Methods
- Space	Maintenance	- Approved Manual

The LAC is very interested in these items; in fact, a large part of the actual site visit is an evaluation of the overall laboratory facility. In the application for accreditation, you

are required to submit a laboratory floor plan with approximate dimensions and labels for major analytical equipment.

You must provide an inventory of the laboratory safety equipment, describe the hazard communication program as it applies to your operation and, finally, you must outline the laboratory policy pertaining to housekeeping because improper housekeeping leads to cleanliness problems and contamination errors. Laboratory ventilation is of extreme importance, and the Accreditation Committee wants to ensure that laboratory fume hoods are functioning adequately and meet performance criteria. You must describe the frequency of air flow monitoring and calibration activities and provide current examples of monitoring records.

Other recordkeeping requirements mandate a unique numbering system for sample tracking; no log numbers are to be duplicated.

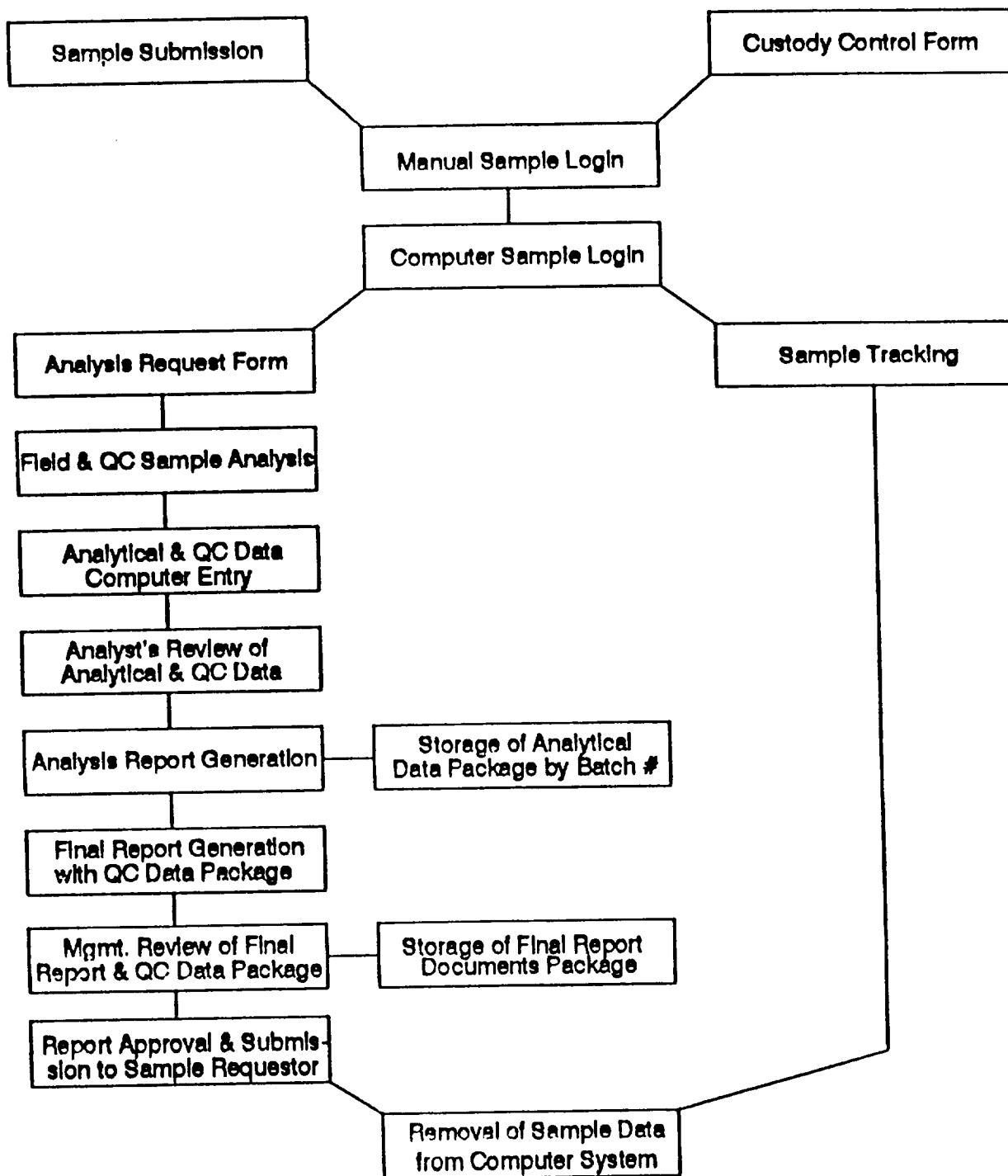
Information Storage and Retrieval System

A good analytical laboratory must exhibit the ability to track progress of samples from receipt and log-in through analysis -- from data review and approval to final reporting with ultimate archival or storage of raw and reduced data. This process is critical to a solid operation and to maintaining organization. Exhibit 6 is a flow diagram of sample tracking in the Environmental Health Laboratory at JSC.

To finalize this section of the application you must also submit examples of completed forms which illustrate this process in your laboratory as well as examples of external laboratory reports with QC reports attached.

The Accreditation Committee is interested in the type and number of analyses completed during a representative 12-month period. This provides you with an opportunity to document all work done in the laboratory and, more specifically, you are also requested to submit a breakdown that reflects actual industrial hygiene and analytical capability. You must list all elements or compounds analyzed for industrial hygiene purposes, the procedure or analytical method used, the instrumentation used, and provide necessary QA references. Analysis which are beyond the scope of your laboratory must also be accounted for, as well as any necessary QC documentation.

**Exhibit 6. NASA/JSC Environmental Health Laboratory
Laboratory Information Management System**



Lead Accreditation

To keep current with the growing concern over lead exposures, the AIHA has developed a National Accreditation Program for laboratories analyzing lead (Exhibit 7).

Exhibit 7. Environmental Lead Laboratory Accreditation Program (ELLAP)

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- o Enrollment began October 1, 1992
 - o Laboratories serving lead hazard assessment and abatements
 - o Paint chip, soil, and dust wipe samples for analysis of lead
 - o Application process and major requirements similar to AIHA LAP
 - o Interim accreditation available is already PAT proficient in metals
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A committee meeting was held in March at PITTCON '92, where representatives from the Environmental Protection Agency (EPA) and National Institutes of Safety and Health (NIOSH) participated. The requirements are much like those for regular laboratory accreditation, and include site visits, etc. During the laboratory inspection, the site visitor submits a sample for analysis. After the initial inspection, site visits are performed every three years. This program accredits laboratories, not individuals or companies, and the data is handled by NIOSH. Currently, no methods for analysis have been specified or required, but you must prove accuracy and precision with the methods you are using in your laboratory.

On October 1, 1992, the AIHA began accepting applications for enrollment. This program is designed for laboratories analyzing paint chips, soil, or wipes of dust, and is to begin in November, 1992. A laboratory can participate in proficiency testing without seeking accreditation. You may submit an abbreviated application if your laboratory is already AIHA accredited and proficient in metals. The Environmental Health Laboratory at JSC plans to enroll in the lead program as soon as possible.